

Serial No.: 10/723,751

RECEIVED
CENTRAL FAX CENTER

AUG 11 2006

1 LISTING OF THE CLAIMS

2 CLAIMS

3 Having thus described our invention, what we claim as new and desire to secure by
4 Letters Patent is as follows:

5 1. (Currently amended) A method comprising diagnosing from a data repository at least one fault
6 in a system, said data repository represented as a directed graph having one or more undivided
7 directed subgraphs, the step of diagnosing comprising the steps of:

8 receiving a first description of said at least one fault;
9 employing said first description to identify a response from the said data repository;
10 if the response is a diagnosis stopping, otherwise identifying at least one subgraph
11 responsive to said first description;
12 using said at least one subgraph in determining said diagnosis, stopping if said
13 diagnosis results, otherwise forming a modified description based upon said at least one
14 subgraph; and
15 replacing said first description with said modified description and repeating the steps
16 of receiving, employing, identifying and using until said diagnosis results.

17 2. (Original) A method as recited in claim 1, wherein the first description is completely covered
18 by the diagnosis, the method further comprising implementing a solution based on the diagnosis.

19 3. (Original) A method as recited in claim 1, wherein the first description includes a set of
20 symptoms describing said at least one fault.

21 4. (Original) A method as recited in claim 3, wherein the modified description includes an
22 additional set of symptoms identified for probing by the subgraph.

DOCKET NUMBER: YOR92000-0773US1

2/37

Serial No.: 10/723,751

1 5. (Original) A method as recited in claim 1, wherein the first subgraph is identified by a method
2 employing an index mapping descriptions to initial subgraphs, the trivial index simply mapping
3 all descriptions to one subgraph.

4 6. (Currently amended) A method as recited in claim 1, wherein said data repository is a remote
5 data repository and said undivided subgraphs are downloaded from said data repository to a local
6 agent performing the diagnosis as needed.

7 7. (Original) A method as recited in claim 1, wherein said system is a system taken from a group
8 of systems consisting of: a machine; a software program; a process; and any combination of
9 these.

10 8. (Currently amended) A method as recited in claim 1, having a at least one limitation taken
11 from a group of limitations consisting of:

12 wherein each said undivided subgraph is implemented as executable code;

13 wherein said executable code is written in an object-oriented programming language;

14 wherein said executable code is written in a programming language that supports late binding;

15 wherein said programming language supports late binding and on-demand downloading of
16 classes;

17 wherein said programming language that is object-oriented and supports late binding and
18 on-demand downloading of classes is Java;

19 wherein said local agent is a machine;

20 wherein said remote data repository is downloaded as needed onto a small computing device;

DOCKET NUMBER: YOR92000-0773US1

3/37

Serial No.: 10/723,751

- 1 wherein said remote data repository is hosted by a service provider supporting a plurality of
2 customers and having each customer download subgraphs as needed to perform diagnosis;
- 3 wherein at least one of said customers is a customer support center diagnosing faulty systems on
4 behalf of a plurality of its own customers;
- 5 wherein said customer is a field representative performing diagnosis of a failing system;
- 6 wherein said customer is a faulty system operating in a self-diagnostic mode; and
- 7 wherein said faulty system applies the solution identified by the fault diagnosis system in an
8 autonomic, self-healing mode; and
- 9 any combination of these limitations.

10 9. (Original) A method as recited in claim 1, wherein said diagnosing is done proactively to
11 prevent faults from occurring in the future and/or to train someone to use said system
12 successfully so that faults will not occur.

13 10. (Currently amended) A method as recited in claim 1, wherein said data repository enables an
14 on-demand fault diagnosis system with a service provider charging each customer for an amount
15 of resources consumed during any diagnosis session.

16 11. (Currently amended) An article of manufacture comprising a computer usable medium
17 having computer readable program code means embodied therein for causing diagnosis from a
18 data repository of at least one fault in a system, the computer readable program code means in
19 said article of manufacture comprising computer readable program code means for causing a
20 computer to effect the steps of claim 1.

DOCKET NUMBER: YOR92000-0773US1

4/37

Serial No.: 10/723,751

1 12. (Currently amended) A program storage device readable by machine, tangibly embodying a
2 program of instructions executable by the machine to perform method steps for diagnosing from
3 a data repository at least one fault in a system, said method steps comprising the steps of claim 1.

4 13. (Currently amended) An apparatus comprising means for diagnosing from a data repository
5 at least one fault in a system, said data repository represented as a directed graph having of one or ;
6 more undivided directed subgraphs, the means for diagnosing comprising:
7 means for receiving a first description of said at least one fault;
8 means for employing said first description to identify a response from the said data
9 repository;
10 means for if the response is a diagnosis stopping, otherwise identifying at least one
11 subgraph responsive to said first description;
12 means for using said at least one subgraph in determining said diagnosis, stopping if
13 said diagnosis results, otherwise forming a modified description based upon said at least
14 one subgraph; and
15 means for replacing said first description with said modified description and repeating
16 the steps of receiving, employing, identifying and using until said diagnosis results.

17 14. (Currently amended) A computer program product comprising a computer usable medium ;
18 having computer readable program code means embodied therein for causing diagnosis from a
19 data repository of at least one fault in a system, the computer readable program code means in
20 said computer program product comprising computer readable program code means for causing a
21 computer to effect the functions of claim 13.

22 15. (Currently amended) A method for diagnosing a fault, said method comprising:
23 commencing a diagnosis session;
24 initializing a current state, the current state being symptoms comprising an initial description of a
25 fault being diagnosed;

DOCKET NUMBER: YOR92000-0773US1

5/37

Serial No.: 10/723,751

- 1 identifying one graph from a data repository of graphs which, when taken together, encode
- 2 symptoms and diagnoses of a system, and assigning said one graph to be the current graph;
- 3 retrieving said current graph from the data repository;
- 4 assigning one node of the current graph to be the current node;
- 5 identifying the node type of the current node; and
- 6 if the current node is of type diagnosis, then returning the diagnosis associated with the
- 7 node as the diagnosis of the fault;
- 8 if the node type is not of type diagnosis then performing a particular node type operation,
- 9 and repeating the step of identifying the node type of the current node, until the node type
- 10 of the current node is of type diagnosis.
- 11 16. (Original) A method as recited in claim 15, wherein the step of identifying one root graph
- 12 comprises employing indexing graphs by symptoms.
- 13 17. (Currently amended) A method as recited in claim 15, wherein:
- 14 the data repository of directed graphs is a remote data repository, remote from a process running
- 15 the fault diagnosis session, said remote data repository comprising a complete set of directed
- 16 graphs which taken together encode the symptoms and diagnoses of the fault diagnosis system;
- 17 the step of identifying one graph incorporates logic to remotely ask the data repository to identify
- 18 one graph at a known or discoverable location; and

DOCKET NUMBER: YOR92000-0773US1

6/37

Serial No.: 10/723,751

1 the step of retrieving incorporates logic to retrieve remotely from said known or discoverable
2 location.

3 18. (Original) An article of manufacture comprising a computer usable medium having
4 computer readable program code means embodied therein for causing diagnosis of a fault the ;
5 computer readable program code means in said article of manufacture comprising computer
6 readable program code means for causing a computer to effect the steps of claim 15.

7 19. (Original) A program storage device readable by machine, tangibly embodying a program of
8 instructions executable by the machine to perform method steps for diagnosing a fault, said
9 method steps comprising the steps of claim 15.

10 20. (Currently amended) A method as recited in claim 15, wherein said data repository enables
11 an on-demand fault diagnosis system with a service provider charging each customer for an
12 amount of resources consumed during any diagnosis session.

13 21. (Original) A method as recited in claim 15, wherein:

14 if the current node is of type call-graph, then the step of performing a particular node type
15 operation includes setting the current graph to be a graph associated with the call-graph node, and
16 repeating the steps of retrieving and assigning;

17 if the current node is of type functional-branch, then the step of performing a particular node type
18 operation includes evaluating a function associated with the functional-branch node over the
19 current state of the diagnosis session, and assigning the value of the function to be the current
20 node;

21 if the current node is of type question, then the step of performing a particular node type
22 operation includes asking a question associated with the current node, collecting an answer to the
23 question, updating the current state with a pair having a form <question, answer>, traversing an ;

DOCKET NUMBER: YOR92000-0773US1

7/37

Serial No.: 10/723,751

1 edge labeled by the answer or by a function that accepts the value as being valid, reaching a new
2 node in the current graph, and assigning the new node to be the current node;

3 if the current node type is of type test, then the step of performing a particular node type
4 operation includes performing a test on the faulty system, adding additional symptoms to the
5 current state based on the test results, traversing the edge leaving the current node to reach a new
6 node and assigning the new node to be the current node;

7 if the current node type is of type lookup, then the step of performing a particular node type
8 operation includes querying a source external to the diagnosis system and the user, adding
9 additional symptoms to the current state based on the query results, traversing the edge leaving
10 the current node to reach a new node and assigning the new node to be the current node; and

11 if the current node type is of type state-transformation, then the step of performing a particular
12 node type operation includes applying a function associated with the state-transformation node to
13 the current state to modify the current state, traversing the edge leaving the current node to reach
14 a new node and assigning the new node to be the current node.

15 22. (Original) A method as recited in claim 15, wherein:

16 a node of type diagnosis is a node representing one definitive diagnosis of the fault
17 and optionally supplying an action plan to remedy the fault;

18 a node of type call-graph is a node connecting one graph to another graph, allowing
19 composition of graphs;

20 a node of type functional-branch is a node which allows a transfer of control to any
21 other node in the current graph where the new node is the computed value of a
22 function (associated with the functional-branch node) of the current state of the

Serial No.: 10/723,751

- 1 diagnosis session, where the current state is represented by the set of all <question,
- 2 answer> pairs formed from questions already answered in the current session; and
- 3 a node of state-transformation is a node which allows modification of the current state ;
- 4 by applying a function associated with the state-transformation node to the current
- 5 state to modify it.
- 6

DOCKET NUMBER: YOR92000-0773US1

9/37